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WAR NEUROSES.

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by

D. Lennox, M.B., Ch.B.

WAR NEUROSES.

During the past few years of war and post-war recovery, much has been done by neurologists and psychiatrists to improve our knowledge of and rationalise the group of neurotic disturbances which one classifies under the term Neurosis. In considering current literature one finds a great deal of confusion and many opposing schools of thought. The main cause of this confusion appears to lie in the opposition both in terminology and thought between those individuals who call themselves psychologists and base their suppositions on philosophy, and the other school, whom one might call the neurologists, and whose foundation is being built on the rock of physiology and dynamics. In ancient times the seat of the mind or the emotions was supposed to be situated in the stomach. Later philosophers believed that it was to be found in the heart, and to-day most people consider that mental processes of all kinds are localised to the brain.

Some thirty years ago the philosopher Bergson enunciated the idea that everything that took place in the surrounding/

surrounding world and in one's own body, including brain and nerve system, consisted only of movements of different kinds and degrees. From the external world movement was spread abroad through our body. It reached the spinal column and the brain by way of the sense organs and the nerves, and proceeded into peripheral movements.

The body is an instrument which receives movement from the outside and restores it to the external world. The only difference between brain and other bodily organs is the relative one that the preservation of action in the brain is stronger and may preserve the action for a longer time. The body, including the brain, is merely an instrument of movement and nothing else. It never helps to prepare and still less to explain a representation. That which in our perceptions can be explained by an action of the brain includes the actions which can be commenced or prepared or occasioned, but not our perceptions themselves. Still less does the activity of the brain comprise any explanation of memory and of higher mental activity. To sum up, the nervous system has only physical properties and has no other power than that of receiving, preserving and continuing movement.

The above view is a materialist conception of nerve function/

function which of necessity cuts out a great deal of psychology and simplifies nerve mechanism to such a point that we can begin to recognise the possibility of explaining mental processes from the standpoint of physiology. When such men as the late Dr. Mercier classify mental disorders as "disorders of conduct," and admit their ignorance of the mind, surely it is an indication that one can sum up the mentality in terms of conduct and action.

In approaching the subject of the neuroses it is essential to have as one's basic conception that they are fundamentally disorders of mechanism. The part of the mechanism which is at fault in most cases is that of expression. In our present conception, for instance, of the subject of sensation, there is a great deal of confusion because no physical terms have been used to describe what are essentially physical states.

In this discussion of the neuroses one must find objective differences to explain these physical disturbances of mechanism. From the study of analytical psychology which was carried out during the War one point is salient, namely that the experiences of the neurotic differ in no way from those of the ordinary healthy man, and they also show that an organic disturbance or failure of equilibrium preceeded the neurotic symptoms. All of us who/

who had an extended experience of being under fire can testify to having suffered from passing disturbances associated with fatigue or functional hypertrophy of the thyroid or other organs, but these were only passing phenomena.

The man who was likely to suffer from a neurosis could easily be picked out long before he heard the first shell; the upset or the personal instability was in existence already, and the strain of battle was only the exciting and certainly not the determining cause of his neurosis.

During the War Sir Frederick Mott was able to obtain a history of pre-existing neurotic symptoms in 80% of the cases of soldiers under his care for neurotic disorders. From the above it will be readily seen that the objective evaluation of organic efficiency would be the obvious mode of examining any given neurosis. This is done by observation, of which there are two methods:- (1) the study of general conduct, and (2) the study of specific bodily reactions or movements. Our observations on conduct are simply everything we can observe of the external and obvious aspect of life. Movements are supplementary to this, and we include under this heading muscular reactions and sensory and circulatory responses.

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The study of conduct by itself, with its mixed motive, is always extremely difficult and frequently confusing. It is dependent largely upon verbal communication, which is necessarily limited to the expression of our requirements. Many of our impressions and feelings cannot be communicated verbally, all of them can never be fully described. If you wish to give a third person a description of your idea of so-and-so's character, you can only give a very rouch sketch of what you really think of so-and-so. If you go to an organ recital it is impossible to describe your sensations to another although you are fully aware that those sensations are not by any means unique.

We admit then that verbal communications to a large extent fail; even the artist who goes a great deal further and presents an impression on canvas can only give us a very imperfect idea and partial impression of his feelings on observing a landscape.

From what I have said I think it is quite clear that an interpretation of conduct and all it implies must necessarily be sketchy and misleading.

As our study of specific reaction becomes more perfected, so we shall be able to fill in the gaps which at present exist in our objective estimation of conduct and its/

its affective states.

Our study of specific bodily reactions or movements will be under two headings: (1) the exterior manifestations of the specialised response of certain nerve mechanisms, and (2) the generalised reaction of the body as a whole to stimuli, which upset or tend to upset the unity of vital action.

The first class referred to belongs to the category of organic nervous diseases more than to the neuroses.

If we sing the separate notes of an octave and at the same time place the fingers on the thyroid cartilage, this can be felt to move upwards with each rising note in the scale. Let us record this graphically by means of an optical lever projecting a beam of light on to a scale; The movement is amplified and can be noted in greater detail. Then let us think of an octave without singing it. Again the thyroid will be found to move and the tracing will be similar to the first, although the movement will not be so marked or quite so regular. Thought is expressed by internal or external speech, and this is as much true of the logical consideration of a mental problem as in the case quoted where the patient thought of the notes in an octave.

In the case of the problem it is a little more difficult to demonstrate because one does not think so clearly in/

in definite word symbols but leaves gaps, the mind passing from essential word to essential word towards its conclusion without paying so much attention to mere word form. Still the fact remains that it can be traced.

In these thought impressions different types of men use different special senses. Thus in memorising a couplet of poetry or adding up a line of figures one type of man will rely mainly on his visual apparatus, another on his auditory and a third may be partially visual and partially a sense of movement; the eye mentally travelling from one word or figure to another. In most of these instances mental speech movements are also associated and take quite a prominent part. If one makes the experiment of asking someone to describe a given scene, starting from a central point in that scene, one may observe that his eyes go to the right as he observes objects on the right of that point and to the left as he observes objects to the left of that point.

These concomitant movements to thought can be also observed to precede action. Get a patient to place both hands palms downwards on a table. For the sake of argument let us say that he is left-handed. Ask him at a given word to immediately dorsiflex the right hand. Now/

Now connect a delicate galvanometer with the extensor group of muscles in each forearm. It will be found that before movement takes place in the right hand there is an electrical vibration in the left extensor muscles. This indicates that before movement there is an activation of these muscles and that as the individual was left-handed he thought of the movement in terms of his left hand. The same thing occurs if the left hand is moved only in a right-hand subject this would be reversed and the latent period before action in each case is the same. A little consideration of ordinary methods of speech expression and symbolism will, I think, be sufficient to show that a dynamic form of imagery is employed to a large extent.

The next point taken up is the study of those movements that denote a generalized reaction of the organism to intellectual or physical effort, and here we shall be able to see and explain many phenomena observable in the neuroses. It is generally recognised that effort is always associated with an increase in muscular tension. This is easily demonstrated by placing one knee across the other and letting the foot hang. This stretches the quadriceps muscle, and if done correctly, the toe when observed against a mark on the wall can be seen to oscillate/

oscillate with each pulse beat. Now let us think of why we pay 6/- in the pound income tax, or let us grasp one hand firmly with the other as is done in re-inforcing the knee jerk, and it will be found that the toe will rise slightly above the mark, thus indicating a contraction in the quadriceps. What is the nature of this? Is it an increase in muscular tonus or is it a so-called voluntary contraction? The work of Wertheim Salamonson indicated the fact that in a voluntary contraction recorded on an electromyogram vibrations took place at the rate of about 50 to the second, whereas in a tonic contraction these were absent. By this means it was found that in the case in point the contraction was tonic. There is also a quite definite current of action which is about .4 of a second in duration and therefore much longer than that of a single muscle twitch, and after this no further electrical variation, but the increased tonus is maintained. This tonic effort reflex has been found to be much increased in cases of unilateral pyramidal lesions on the affected side. In cases of tabes it is much diminished, but still present. In a case of cerebellar tumour with marked unilateral hypotonus it was absent on the affected side and normal on the sound side. In the case of this knee reflex the flexor muscles from/

from the position of the leg are already in tonus, whereas the extensors are somewhat relaxed and the sole result is therefore to increase the extensor tonus.

From a graphic record of both the flexor and extensor groups of muscles in a limb it was found that the tonic effort reflex showed an increase in tonus in whichever muscular group was most stretched out at the time. Thus if the knee were semi-flexed the increase in flexor and extensor tonus was equal, if extended then the flexor tonus was increased, and if flexed, extensor.

The old view of this increase in tonus is exemplified in the interpretation usually given to the reinforcement of the knee jerk by muscular effort, or to the increase in this found in disease, the idea being that the increase was due to a lessened cerebae inhibition. In view of the above experiments, which prove an increase in muscle tone, this older view must be abandoned, especially as the latent period in a reinforced knee jerk as compared with the normal is shortened some 15 to 20 micro seconds.

Examining head movements along similar lines, it was found that during thought or effort, lateral movements of the head appear to have little significance, but that there was a definite flexion of the head during mental/

mental concentration which lasted for the duration of the effort.

This movement appeared to be also due to tonic contraction of the sterno mastoid. The examination of respiratory movements proved rather more difficult to execute, and was eventually carried out by means of a tube fixed at the external naves and communicating with a tembour. The result of this examination showed that respiration was slowed and the tidal air reduced in amount. This was attributed to a definite contraction of the chest muscles, which thus impeded respiration, and to bear this out it was discovered that intraplural pressure was markedly increased. One or two cases in which a cerebro-spinal needle has had to be passed into the chord were also found to give a marked increase in cerebro-spinal pressure during effort.

As regards the circulatory response to effort, there was a very definite acceleration in the heart's rate, and this was attributed to accelerator stimulation rather than loss of vagal control, because systole and diastole were both shortened. It was also found that systolic and diastolic pressure were both raised.

Both the above phenomena are probably partly vasomotor and partly cardiac in origin. The vasomotor change/

change can be definitely proved by the fact that the limb decreases in volume during effort. The effort reflex undoubtedly has a marked effect on the abdominal viscera, but this is difficult to demonstrate precisely. There are one or two instances which strike one as proof, one of the most obvious being the increased tone of the bladder during emotion, particularly fear or excitement, similarly emotional spasm of the bile duct.

It was also demonstrated that flaws or variations in concentration caused a similar variation in the effort tonus. The subject was asked to keep the tip of a pointer just touching the centre of a tambour, and as his concentration varied so his pressure on the tambour varied and was recorded. At the same time his quadriceps and circulatory tonus were recorded and found to vary correspondingly.

Let us now summarise the objective study of bodily activity in response to a stimulus. This we may now conviently call effort.

I. Bodily activity was increased in all cases, and there was no sign of anything of an inhibitive nature.

II. The magnitude of the general reaction to effort was in direct ratio to the difficulty of the task; also when the generalised action was diminished the accuracy of the response was also diminished.

III. The result of the general response was to promote increased efficiency. There was increased vascular tone, intracranial and intrathoracic pressure were increased, as also was muscular tone.

So much for physical phenomena; and now let us examine the effect on consciousness.

The general feeling that one has when one is called upon to perform a task is one of discomfort, and the more difficult and irksome the task, the greater the discomfort. This discomfort as far as one can analyse appears to be mainly a feeling of tension, for instance in performing some difficult mechanical operation such as threading a needle one instinctively holds one's breath and sits in a position of strain. Work is never a pleasure/

pleasure and is never liked or appreciated by any of us; what we do appreciate is the relaxation from tension which follows the completion of the task.

The cause of this discomfort is a little difficult to trace precisely, but it appears to be a sort of protective mechanism. Thus a task is necessary to our well-being and therefore must be performed. Something threatens us, it may merely affect our comfort, it may be dangerous to life; in either case it evokes a response which varies according to the magnitude of the threat. When the necessary protective action has been accomplished, obviously we feel relief because the danger or discomfort has been avoided. Now in the case where this protective mechanism fails to produce adequate action, then, as we have seen above, the discomfort or emotional disturbance will be the greater. This we shall find to be the case when we come to study the neuroses.

ALTERATIONS OF ELECTRICAL REACTIONS OF THE SKIN OBSERVED DURING RESPONSE TO STIMULATION.

So far in our study of reactions we have simply observed the contractions of striped and unstriped muscles. The work of E. K. Muller and others has proved beyond a doubt that there is a definite electrical variation observable on the skin surface which occurs during and after response to a stimulus. This Muller calls the physico-psycho-galvanic reflex. Briefly, the results obtained were as follows:- that a deflexion of the galvanometer occured as a result of the response to stimuli, causing an alteration in the affective state. This alteration was a diminution of the electrical resistance of the skin to the passage of a constant current. This variation is found all over the surface of the body, but most markedly on the palms of the hands. Crile has shown us that any diminution of electrical resistance indicates increased metabolic efficiency. As the diminished resistance is most noticeably found in areas where sweat glands are most numerous, this would seem to indicate an increased activity on their part. The first condusion one would jump to is that the increased amount of moisture on the skin would naturally increase the conductivity.

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One or two cases of neurosis have been observed, however, in which certain skin areas were constantly soaked with perspiration, and it was found that electrical variations following stimulation could be obtained in these areas. It is obvious that glandular stimulation can only occur from nerve endings arising from the sympathic, and it thus becomes obvious that the glandular response like other responses to nocuous stimuli arises from the thalamic system. No doubt the peripheral dilation of blood vessels would produce increased glandular activity, but the stimulation would probably be from the same origin, and in any case a limb which has been partially exsanguinated by pressure bandages will still give a result.

Having thus summarized the origin and nature of the skin reflex, let us now proceed to examine the various phenomena produced in detail.

Nature of stimulus producing skin reflex.

To produce a galvanic reflex it is necessary to have a stimulus capable of producing an affective state. This does not mean to say that an affective state is produced whenever the reflex is evoked. Supposing a hot substance is placed on the hand of the subject, sufficiently to/

to burn him a little; the first time this is done it will cause some emotional disturbance, but with each repetition the emotional disturbance will become less and less, until the patient is frankly bored with it. The galvanic response, however, will remain the same in each instance. Similarly, in the case of neuroses, during a word association test one may mention a word which has a definite bearing on the suppressed constellation, and the patient may be unconscious of this bearing and quite free from any conscious effect, and yet the galvanic response is present.

It would seem, then, that the reflex is a part of the mechanism of expression of the affective state, but is quite distinct from that state. At the same time it affords us an absolutely true indication of the existence and degree of effect from a given stimulus.

This will be clearer from an example. It is possible to evoke a reflex by recollection of a past experience. If we consciously attempt to recollect the pain produced by a sprained ankle, no galvanic response will occur, because we have no definite vivid and painful recollection of the last time the ankle was sprained If we think back to a larger and more comprehensive affective experience, such as the loss of a very dear relative, then the galvanic response/

response is evoked because there is still a vivid memory experience or constellation remaining in one's brain.

The practical point of this will be obvious, namely, that by the use of this reflex one is enabled to estimate the value of a definite past experience in relation to a neurosis. Emotion cannot be acted for this test, it must be genuine. The stage murder or the recitation of emotional poetry cannot produce it. It has also been clearly shown that it is impossible to inhibit the reaction consciously. This is demonstratable by direct experiments on patients, and is also obvious from the analogy that a hidden constellation when touched upon produces a reflex. It is found on experiment that the intensity of the reaction is modified (1) by the strength of the stimulus; (2) by whether the patient is expecting the stimulation; (3) if he is doing something else at the same time, such as mental arithmetic; (4) if he is fully stimulated in another direction at the same time.

The response is greatest in (3) because mental concentration produces a heightened tone and therefore a greater sensibility. In (4) it is reduced because another affective state is introduced which causes an antecedent electrical variation. In (3) if the concentration is sufficiently/

sufficiently intense to cause strong discomfort, then the reaction will resemble that found in (4).

The modifications above indicated only occur in cases where the stimulus is not maximal. If the stimulus is repeated frequently at regular intervals and always of the same intensity, then we get a diminution and finally a disappearance of the electrical reaction. This is probably outside the reflex arc and might be described as a progressive indifferance of the higher connotive thought, evoked by the stimulus. If the sequence of intensity of the stimuli is varied, then the descent of the reaction curve is interrupted.

The ratio of response to stimulus.

The degree of response will obviously depend upon the intensity of the stimulus. This is difficult to show precisely because of the varying condition of the patient at any moment, the difficulty of obtaining a standard stimulus, and also from the fact that if the stimulus is maximal or the patient somewhat exhausted, as in cases of neuroses, the effect of the first stimulus lasts for an appreciable time and will tend to enhance the succeeding ones.

Another interesting point is that the apparently logical anticipation of the stimulus without the actual recurrence/

recurrence of it will produce the reflex. For example, repeated shocks from an induction coil may be given by the closing of a circuit by the key. After a time one of the wires may be disconnected, and when the patient hears the click of the key, although no shock is experienced, the reflex will occur and is of the same magnitude as when the actual shock was felt. The consideration of the above "conditioned reflex" throws considerable light on the relation between bodily response and affective state.

Detailed examination of circumstances modifying skin resistance.

From experiments carried out as far as possible under similar conditions, and using maximal stimuli (a pistol shot), it was found that the initial skin resistance to stimulation varied at different times in the day; the lowest resistance being registered about noon. This rather indicates that cerebral activity may be at its highest at this time, but that this is not necessarily true of efficiency because the highest form of cerebral activity is criticism and inhibition, and this necessarily affects efficiency adversely.

Miss Waller has also examined 70 students before and after undergoing a competitive examination. The results in the main show that those students who obtained the highest marks/

marks had the lowest skin resistance. The reaction time necessary before the appearance of the reflex varies according to the intensity of the stimulus; the greater the stimulus, the shorter the reaction time. It also varies according to the nervous excitability of the patient, and where association and memory processes are necessary, the action will be still further delayed. The reaction time to a simple sound varied from .8 to 2.4 seconds; the duration of the phenomena will depend upon the first two of the above-mentioned factors.

It is as well to note here that there is no real difference between physical and psychical stimuli in the galvanic response produced by them, and that this response can only be elicited by what we had better now call nocuous stimuli, that is stimuli which threaten bodily entity or well-being.

Other responses to nocuous stimuli.

Nocuous stimuli produce similar responses to those elicited in the tonic effort reflex discussed at the beginning of this paper. Muscle tone is increased, the respiratory curve is altered in the same way, etc. There are certain definite differences, however.

Firstly, the head, instead of being bent forward is retracted/

retracted. This is not a protective reflex, because the retraction occurs just the same whether the nocuous stimulation is applied to the back or the front of the body. Similarly, the heart's action is accelerated as in the effort reflex, but this acceleration is due to lessened vagal control, which is proved by the time relations of the cardiac cycle.

The vasomotor effect is also different, there being a distinct diminution in the volume of the limb, as recorded by the plethysmograph. In this last there are two sources of error. Firstly, involuntary movements of the arm in the plethysmograph. This can be obviated by a special plethysmograph attached to the arm . The second source of error is alterations in muscular tones, but these will be insufficient to account completely for the result.

Response to benign or pleasing stimuli.

The results here are much more difficult to obtain and not nearly so definite. A slight pleasurable sensation will produce no reaction at all, and it is necessary to produce a feeling of considerable relief or of marked pleasure. This of course is difficult to do in laboratory surroundings. The most feasible methods are either the relief of hunger or thirst or else to prepare the patient/

patient for a series of very unpleasant experiments and then suddenly tell him that they will not take place. Under these circumstances, when the reflex is elicited it appears to be much less sudden and definite and more in the fashion of a gradual relaxation of tension. The heart's action is slowed, muscular tone is relaxed to a degree greater than normal, and there is a vaso-dilation; the skin resistance slowly rises to above the normal. We can see then, generally speaking, that the response to a benign stimuli is a diminution of organic activity. Looking at the general results, it would appear that pleasure is rather a negative than a positive phenomena, and hardly more than a relief from pain. If this is the case, how do we explain marked pleasurable excitement, such as the cheering of crowds, great joy, and so on? The explanation appears to be that these are not purely pleasurable sensations and that prior to the emotional ebullition the individual was under considerable tension and that the excitement was merely the release of various reflexes which were up to that point under strong inhibition. Amongst these there would be the release of the natural instinct to communicate with others.

An indication of the nature and character of a physical or psychical reaction.

Up to the present we have merely examined the actual results of the response to a stimulus, and we have said nothing about the forces which are evoked to produce this result. In the present state of knowledge, little if anything is known of this force, and it has been customary to consider that a nerve impulse is similar or closely allied to an electrical phenomena.

Recently Dr. Charles Russ has performed some very interesting but rather complicated experiments on the effect of vision upon a light absorber. These prove the existence of a ray of force proceeding from the human glance. He suspends a form of condensor by a thread, and attached to this condensor is a mirror which registers on a scale. Also attached is a magnet which keeps the condensor in the position of north and south. When a glance is directed at this instrument, there is an immediate deflexion, varying in intensity away from the poles. When the glance is removed the instrument assumes its normal polarity.

In his experiments he appears to eliminate by various devices the main factors of error, the chief one being a variation in temperature. Taking the results of these/

these experiments as positive, a very interesting field is opened up for the discussion of the nature of a nerve impulse and the possibilities of telepathy, and also the intensity and amount of nerve energy to be found in different individuals and at different times.

So far we have studied the physiological response to various forms of nocuous stimuli. Now we must determine the relation between these responses and the affective states. Of course the responses dealt with are not by any means a comprehensive list, but they afford a quite adequate index as to the existence and degree of the affect.

The relation between sensation and affective states.

A sensation is an elementary process with the attributes of quality, intensity, clearness and duration. An affect is all the above with the exception of clearness. It is impossible to attend to an affection. We can usually mention the attributes which cause us to like anything, but the moment we concentrate our attention upon the actual liking, we lose the affect and receive an unpleasant sensation. Thus, if we attend to a picture and look at it, we like it, but if we attend to the actual liking of the picture we cease to like it, and in this lies the essential difference between a sensation and an affect.

Head and Holmes have made this quite clear by their investigations which show that two systems of different function/

function exist; the one reacts to nocuous stimuli and its effector organs are either not under the power of conscious effort, or else are merely combinations of reflexes which cannot be activated voluntarily. The terminal ganglia for this mechanism are in the thalamus. The system is developed much earlier in evolution than the cortical system, and is elaborated from the various protective reflexes. The other system is of complexes of appropriately adjusted reflex patterns which take their origin from stimuli, either nocuous or benign, and whose terminal co-ordinating centres are in the cortex. The function of these is discriminatory, and it is in their co-ordination that we find consciousness.

These two systems are co-operative in function. When cortical activity is inhibited, the thalamic system may be activated to help to overcome the resistance. Conversely, when the thalamic effector organs are stimulated to a certain degree of intensity, the cortex is informed and we become aware of a change in bodily sensation. This consciousness of disturbance we term an affective state. Discrimination then is a function of the cerebral cortex, and a certain stimulus or group of stimuli would be integrated with a specific reflex pattern activity, and stimuli of thalamic origin would reach the cortex/

cortex from all over the body. Thus we should become aware of a diffuse sensory disturbance with no one group of sensations predominating.

When the thalamic activity is a response to a maximal stimulus, for example intense fear, certain of its elements may be so intense as to swamp the other, and the result is an ordinary sensation. This can be observed under fire, where a man may complain of a feeling of constriction of the throat, or intense nausea, and it will only be after the repetition of the experience or after he has had time to think it out that he will recognise the connection between these and the danger experienced. It is in the predominance of one or other of these organic sensations that we find the explanation of the visceral types of neuroses.

Often it is the effector movement rather than the sensation which holds the attention, as in vomiting or micturition as a response to nocuous stimuli. As we have already seen, the organic response to nocuous stimuli is action, and to pleasant ones quiescense. This is also true of the thalamic system.

The origin of the affective states.

At this point it is essential to decide whether an affective/

affective state is the result of physiological changes of bodily activity or whether these changes are conditioned by a preceding affective state. The James-Lange theory takes up the position which at a glance would appear to be the correct one, namely that if one is insulted one becomes angry and strikes; if one is threated one fears and one runs, etc. From what has been said before, however, one must maintain that this sequence is incorrect and that the bodily manifestations must be interposed between the two mental states. We feel afraid because we run, and we feel angry because we strike.

Now let us attempt to find objective proof of this. Sherrington attempted as far as possible to cut off the different paths of somatic sensation in a dog. He cut the spinal cord in the cervical region and then performed a double vagotomy. In spite of this cutting off of organic sensation, the dog still showed signs of emotion when angered or threatened. This experiment is not conclusive; all that one can say is that the emotional manifestations were confined to the head and neck, and we have already observed changes in muscle tonus in these areas a a result of organic emotion.

Let us now return to bodily reaction. A record was taken of the reaction to a nocuous stimulus manifested by the/

the galvanic reflex, of a motor voluntary reaction and of an involuntary motor reaction or start. The latent period of a start was found to be .08 of a second. This is appreciably longer than that found by Sherrington in animals, and is found to be the rule for the start reflex as elicited in man. It is therefore by no means certain that it is of the same bulbar origin as the reflex in decerebrate animals. It is also not an invariable accompaniment to affective states, and therefore we may disregard it.

The next event on the graph was a voluntary motor reaction, the latent period of which was about .2 of a second. The third event was the initiation of the galvanic reflex, and its latent period was 2 seconds. We may take the galvanic reflex as a manifestation of the general bodily reaction, and as such an indication of an emotional state, and we can say that it occurred at least 1.8 seconds after the initial stimulation had been received and acted upon. It might be said that the galvanic reflex is a response of the same nature as a voluntary motor contraction, but of remarkably long latent period. The latent period of the plethysmographic response, which can be measured fairly accurately, we have seen to be the same as a galvanic reflex. Also from experiments/

experiments it has been found that the latency of pulse rhythm alteration cannot be less. We have seen that the acceleration of cardiac rhythm is due to removal of vagal inhibition, and experiments give a latency of about 1 second to the vagal reflex. As far as can be seen, respiratory changes are never less than 1 second. The tonic reflex had a latent period of about 2 seconds. Visceral and glandular activity from indirect evidence would appear to be at least as long in response. Thus the objective evidence is definite, the stimulus is perceived, differentiated and acted upon long before its sensory concomitants could produce an affective state.

The next point to be discussed is whether an affective state cannot under any circumstances precede this motor response. This is doubtful, and there is evidence that the existence of the bodily concomitants will facilitate the representation of some situation which will then be assigned as its object. Marānon, by injecting a small dose of adrenalin into a sensitive patient, obtained subjective sensations similar to those observed in the affective state of terror; although the patient himself realized that he was not afraid, he merely felt as if he were. If an appropriate verbal stimulus was then supplied, the patient had a complete emotional breakdown.

Effect of nocuous stimuli on endocrine secretions.

The experiments of Cannon have demonstrated that states of great emotional excitement are sometimes accompanied by a hyper secretion of adrenalin. This he proved by direct serum tests and by the occurrence of glycosuria. This may be true up to a point, but it has not been proved that adrenalin is found normally in the blood. We must also remember that the effector organs of the vegetative nervous system respond in just the same way to thalamic stimulation as to internal secretion. Even in the grave emotional states where adrenalin can be demonstrated in the blood, it is in insufficient quantity by itself to produce these states. A number of experiments were made of painful faradisation for a period of 10 minutes on a human subject, and after each no hyperglycaetria was demonstrable. It was assumed that this pain was more severe than anything likely to occur in the ordinary run of daily life, and that therefore ordinary occurences would not be likely to affect the secretion of adrenalin. The same criticism would apply to the other endocrine secretions with even greater force.

When we come to consider the effect of the ductless secretions on the threshhold excitability of the thalamic system, we find much more definite results. It is a matter/

matter of common clinical knowledge that a hyper excitability exists in patients suffering from hyperthyroidism. Experiments show that the hormone of the thyroid has a marked influence upon bodily activity, and Rendal has demonstrated that an indoxyl iodine compound, which he considers the active principle of thyroid, can raise basal metabolism 2% in a man weighing 20 kilos when given a dose of 5 mg.

It will be remembered that the electrical resistance of the body showed a diurnal curve of variation, and this can be modified by the ingestion of thyroid. The general skin resistance is then lowered and the variation is largely masked. Also the galvanic response to sound stimuli is markedly increased. Subjectively the subject was aware of a marked degree of irritability which lasted throughout the time of the thyroid ingestion experiments and this was accompanied by a definite increase of power of performing work. Vijouroux has also demonstrated a diminished skin resistance in exophthalmic goitre. There is some direct evidence that the internal secretions of the gonads facilitate the specific affective response to sexual stimuli. This is seen from testicular grafts in man and animals.

The evidence with reference to other ductless glands remains/

remains as yet to be worked out. In considering the above, it must be remembered that the various ductless glands are well supplied with afferent nerves, and it is quite possible that the glands may stimulate the thalamic system by means of these rather than by their internal secretions.

By applying a small rubber catheter to the parotid duct, it was found that nocuous stimuli diminished the flow of salica. It also seems probable that the gastric and intestinal secretions are affected in a similar manner.

So far we have seen that we can regard all forms of cerebral activity in terms of muscular and glandular activity, and before applying this knowledge to the study of the neuroses one must go a little into the more complicated mechanisms, in their barest outlines. I have already referred to the conditioned reflex and have shown the electrical variation in skin resistance which is evidenced in the patient after he has been taught by repetition to expect an electrical shock, even if this shock does not occur. Thus he responded to the click of the key although the circuit was not closed. This indicated a cortical discriminating mechanism which had taught the individual to expect a shock, and it is quite/

quite logical to suppose that if the key was clicked a number of times without a shock resulting, the mechanism would continue its function and form a further reflex pattern and still further elaborate the protective mechanism.

It was found that after a series of repeated shocks the latent period of response gradually decreased and finally settled down to .18 of a second, and that when the conditioned reflex was elicitated by a click alone the latent period remained the same. Thus we see that probably the same cortical mechanism which initiated the reaction was responsible for its maintenance. In this statement lies the nucleus of one of the most important facts in psychotherapy, namely that the path of this conditioned reflex if followed to its artical mechanism should lead to the conflicts, repressions and emotional stresses which were originally responsible for the mechanism.

The conditioned reflexes of daily life.

Most of our daily conduct is made up of these conditioned reflexes or habits, and the more these have been repeated, the more difficult it is to interrupt the path of a reflex pattern by some fresh stimulus.

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A verbal of physical stimulus which tends to impede the path of a habit reflex pattern will have the effect of an intense nocuous stimulus, and the ensuing thalamic mobilisation will obviously produce a marked affective state. If this contra-stimulus frequently recurs we shall have a new reflex pattern set up and an active opposition to all feelings of discomfort, which would be caused by interfering with the primary habit. This is made use of in psychotherapy, where by repetition of unpleasant experiences one eventually destroys the affective reaction to them.

The next type of reflex pattern we have to consider is the inherited reflex which has never been consciously conditioned by the subject, and is peculiar to all individuals of that race or species. This is known as instinct. This is evoked by a specific stimulus. The end result of the reflex is always the same for each specific reflex, and it is a mere matter of change whether the subject is aware of this end result or not. For example, an insect lays its eggs and prepares food for the larvae that it will never live to see. It is important for the treatment of the neuroses that one should find out whether these instinct reflexes have any relation to discriminatory mechanisms, as then by methods of/

of association we could determine their origin. In the case of a habit reflex it is comparatively easy by free association to trace its origin. The habit arose as a discriminatory response to a certain stimulus and this stimulus can be recalled by appropriate methods. If instinct is an inherited pattern it would seem well nigh impossible to elucidate its origin from conscious association.

To-day there are two main schools of thought, one of which considers that instinct is an inheritance from a conditional reflex in a remote ancestor. If this were the case then it might be possible to trace back the instinct to its neighbouring and associated thoughts and so work out its origin. The other school headed by Bergson take up the Darwinian stand point that instinct is merely the result of a natural selection and in consequence of this deny the existence of logical associations. To attempt to clear up this point one must search for an instinct in man which is quite unconscious and consequently quite immune from the influence of suggestion; and then we must see what objective evidence will be afforded.

The expression of the nest-making instinct in human beings.

It has been found in numerous instances in midwifery practice/

practice that two or three days before child birth the mother evinces considerable excitement and emotional stress which frequently is expressed by the ransacking of drawers and tidying up of papers, etc. When interrogated in one or two cases as to the cause of this behaviour the patients have replied that anything might happen to them and that they wished to have everything in order before the event. Now in some of these cases the people have been wealthy and have not prior to this evinced any strong sign of domesticity, etc.; and it seems difficult to believe that the explanation given was the true one.

Now let us go to the animal world and it is again observed that in the case of rabbits, two or three days before delivery the doe exhibited a frantic state of excitement rushing about the hutch and collecting bits of hay, tossing them up to unravel them, and finally carrying them to a dark compartment at the end of the cage. She was making a nest for the expected young.

Similarly we find this nest-making behaviour prevalent in the higher apes, and it is fairly reasonable to assume that the drawer cleaning and tidying up are expressions of the animal nest-making instinct.

In this instance there is no possibility of mimicry or/

or suggestion, and the mother is quite unaware of the existence of the instinct. When questioned she gives an explanation which has no possible association with the instinct. The distinguishing feature of an instinctive reflex is its urgency. The least opposition evokes intense bodily reaction and such an explosion of feeling we call compulsion. It cannot be translated into the language of practical thought and has no association except with the immediate instinct mechanism. These instinct patterns undoubtedly play an enormous part in the mechanism of conduct and as can be seen from the above their recognition is a matter of extreme difficulty. They can only be distinguished from conditioned reflexes by an almost impossibly minute knowledge of the past experiences of the individual. It is not intended here to attempt a classification of instinct reflexes but only to study the objective result of bodily responses and conduct. It is obvious that instinct will have a directly detrimental effect at times to the personal entity and conversely that environment will affect instinct and habit very materially. The essential point for us is not the classification of instincts or habits but the relationship of these to the affective states.

So far one has endeavoured to outline the objective features of the fundamental mechanisms of cerebral activity. It is now proposed to endeavour to apply this to the study of the neuroses.

These mechanisms as we have seen are essentially of two orders:-

I. The higher discriminating cortical activity expressed in movements originating with the voluntary nervous system, that is, muscular movements and its kinesthetic representation in the motor cortex.

II. General bodily reaction to what has been termed nocuous or unpleasant stimuli which are expressed in the thalamic system and effector organs. As the essential function of the nervous system is movement we should expect to find that the functional disturbances here discussed, that is the neuroses, would be the expression of chemico-physical changes affecting movement in various groups of neuroses. Unfortunately our knowledge of the chemistry of nervous tissue is not sufficiently advanced to show this definitely.

It is evident that the study of the neurology of the future will be carried out along the above lines. At present we can only rely on the analogy of the similarity of the results seen in neuroses and of the effect of certain toxic substances in their disturbance of function.

Sir/

Sir Frederick Mott has done much to demonstrate the micro-chemical signs indicating disturbance of function in the neuroses. Pighini has also done suggestive work on the chemistry of metabollic disturbances. Koch and Sydney Mann working in the L.C.C. laboratory suggest that deficient oxidation is the explanation of micro-chemical changes shown by Mott to be characteristically found in the nerve cell in dementia praecose.

If we accept the chemico physical theory, most of the work of Jung and the psychological school of thought is discounted.

It is also suggested that the processes of nervous activity are probably of the nature of catelytic phenomena. Braikford Robertson has determined the curve of the velocity with which the simple movement of drawing a line an indefinite length is performed. His curve showed that the velocity underwent progressive acceleration beginning slowly and reaching a maximum and then diminishing. The beginning and ending of each curve was asymptotic. He also showed that such a curve is typical of a chemical process of such a nature that it is catelysed by one of the products of reaction. Examples of this are well-known in chemistry where the products of the reaction accelerate the process. For example the hydrolosis of cane sugar at/

at 100° F.

In such a reaction a point must be reached where the decrease in the active mass of the reacting substance balances the increase of the active mass of catelyser.

The association of Catelytic reaction with defective oxidation in nerve cells.

The point of the above is that it affords evidence that the neural process conditioning the movement is catelytic in nature. Mott has shown that the nervous asthenia found in marked myxoedema and dementia praecose are associated with defective oxidation in the cells.

If we correlate these two observations an interesting parallel is indicated and we should expect to find somewhat similar chemical changes taking place in the asthenic types of neurosis. In a patient who suffered from lack of power to concentrate and marked mental fatigue when set to obtain a record with a mosso ergograph it was shown that the fatigue was not pheripheral because there were no signs of muscular fatigue on electrical stimulation before and after the tracing was taken. If an ergograph is taken of such a patient simultaneously with a tracing of his effort tonus, it will be found that the latter dies down much more quickly than the normal and this serves to point, as we shall see later, the essential difference between/

between this asthenic type of patient and those suffering from hysterical weakness. It also indicates how essential it is in the asthenic case to restore their bodily condition before an attempt is made to stimulate their efficiency.

The Association between Hyperthyroidism and Excessive Response.

Let us now consider those disorders which manifest an excessive objective and subjective response to nocuous stimuli. As has already been indicated, the normal response to a nocuous stimulus is motion and to a pleasant one quiescence. It is impossible here to give a detailed account of all the conditions associated with hyperexcitability and it is only proposed to indicate the means by which one can diagnose with some degree of certainty this class of conditions. We are dealing here with cases in which there are modifications of the excitability of the autonomic system, and this suggests that these are due to hyper and hypo function of the endocrine system. The effect of the secretery alterations has been most extensively studied in the case of the thyroid gland. The cardinal symptoms of this are well-known; but it seems to be insufficiently recognised that there are a number of cases of/

of neurosis exhibiting hyperexcitability of the affective mechanism, tachycardia, vasamotor disturbances, and tremor, but no thyroid enlargement.

In such cases the important points to observe are three in number:-

I. The hyperexcitability of the affector mechanism as shown by the galvanic reflex. The skin resistance is of course markedly lowered, and this is always present in cases of hyperthyroidism.

II. The estimation of the basal metabolism. This is always above normal and can be estimated by means of thyroxin.

III. The intradermic test of Goetsch. This depends on the demonstration of sympathetic activity by the injection of minute quantities of adrenalin just under the skin. This test really demonstrates only a local hyperexcitability at the junction between the sympathetic neurone and the effector cells. By itself it cannot be held to be absolutely diagnostic, but it is an important confirmation of the two preceding.

The most practicable method of carrying out the test is the modification of Ascoli and Faggioli. 0.05 c.cm. of 1 per 1000 solution of adrenalin is injected with a fine hypodermic needle just under the skin, so superficially that/

that the whole course of the needle can be observed with the naked eye. The resultant swelling after a few minutes assumes a dark blue colour as if ink had been injected. It then becomes surrounded by an alabaster-like halo which grows in intensity and extent and sends out irregular shoots in one or more directions. Surrounding this again is a reddish ring of varying intensity. The alabaster zone often has an appearance of goose-skin from pylomotor contraction. The reaction reaches its maximum in about half an hour; remains stationary for an hour, and gradually disappears leaving ultimately a small swollen papule. The test can be performed in greater dilutions and can be observed with lessening definition up to one in a million dilution. This enables one to obtain a certain quantitative index. In some cases of menopausal disturbances of arterial hypertension, of Graves disease, and of pregnancy, the delicacy may be increased up to one in five to twenty millions. When performing the test it is advisable to use a control of distilled water as some emotional individuals react similarly to this. Positive results have been obtained from this test in all cases exhibiting hyperthuroidism with hyperemotionalism and in a number of climateric cases in which there was flushing/

flushing, giddiness, nervous tremors, and an excessive galvanic reaction (all of which would indicate thyroid excess).

From the foregoing it seems clear that hyperthyroidism is a frequent factor in hyperactivity of the mechanism of affection. It is however not the only cause, as this hyperexcitability is found associated with other bodily states, for example, in diabetes; at the climateric; at puberty. It can also be produced by many drugs; such as adrenalin. There is no doubt that hyperthyroidism can be produced by environment, as evidenced by the number of cases which developed symptoms of Graves disease within a few days of being exposed to danger in the late war. It is obvious however that in these cases there must have been some pre-existing abnormality of function, because only a small percentage of those exposed manifested the symptoms. It appears also that long continued excitation of the affective mechanism caused a temporary increase in thyroid activity. This was shown by French observers in the civilian population of bombarded towns. Where there is no pre-existing excitability these states are not lasting.

The Release of Nervous Mechanisms by internal secretions and by the stimulus of environment.

Our knowledge of the relationship of nervous mechanism to/

to the various internal secretions is still very scanty. It is however probable that many of our primary instincts may be to some extent invoked by the activity of other ductless glands besides the thyroid although it is probable that suggestion will still play a part in these. Suggestion naturally leads up to environment and what most writers consider an environmental stimulus is really a modified suggestion. The next type of neurosis is that in which some line of conduct is at entire variance with the demands of environment, and which can be recognised by the presence of affective symptoms caused by interference with it. These conditions may have had their origin at a time when the instinct was not at variance with the environment, or again they may have been re-awakened by a temporary recurrence of the original environment. Clinically similar to these conditions we have many of the conditioned reflex patterns or habits. Interference with both types would naturally cause a marked bodily reaction or affective response. It will be obvious on consideration that the amount of disturbance caused by interference will vary with the individual, according as to whether he has an excitable nervous mechanism or not. In the former we get a neurosis, in the latter, an eccentricity.

The Application of Psycho Analysis.

From what has been said about instinct it will be obvious that/

that it is a hopeless task to endeavour to find out the primary correlative associations of an instinct. In dealing with a habit however this is quite feasible and it is nearly always possible by finding out the primary affective state which conditioned the habit to supply other and more normal associations which will in time become linked up and cause a more normal reaction. To endeavour to do this is the main object of the psycho-analyst, and to do so by means of an appropriate word stimulus is perfectly legitimate.

One of the main drawbacks to the attempt to discover the associations of the definite mechanisms which lie at the root of a neurosis, is the fact that it is extremely difficult to eliminate the quite unconscious suggestions of the investigator. If the individual is asked, for instance, to perform a word association test, it is quite possible for him to pick up a good deal of information from the operator. We have previously noted that mental activity is expressed in some form of movement and we know that this is not confined solely to vocalisation.

There are all kinds of movements of the eyes, the mouth, of slight gesture which are of an involuntary nature but which can express approval or disapproval quite clearly; and it is quite likely that a patient who is, as in the case/ .

case of most neuroses, admittedly in a very suggestible state, may pick up his associations from the operator, who is in all probability expecting a particular result. The subject is warned to give his whole attention and to dissociate his thoughts from all other stimuli but those proceeding from the operator. He is also told to reply without self analysis or hesitation. The enormous extent to which suggestibility of a patient can be increased may be observed at any spiritualistic seance where the members will pick up almost imperceptible hints and evince a most refreshing credulity.

The most efficacious method of determining the thought associations of an affective state is to allow the patient to tell his history completely without any comment and to sit hidden from him where he cannot observe, and to jot down headings of his story with time intervals. At the same time a revolving drum registers his galvanic response. Afterwards the two results may be correlated and much information obtained without any possibility of heterosuggestion. This will also give more accurate results in another respect; namely that when examining a patient it is by no means certain that the greatest emotional manifestations will necessarily have an underlying and associated affective state, as the patient will often attempt to produce an effect of pathos and the galvanometer will remain unmoved; whilst a narration of/

of some much less prominent incident may have a definite relation to the patient's orientation and affect the galvanometer markedly. Also it does not follow that the effect from one incident will always be the same. The individual's emotional equilibrium is different at different times. Sherrington and Groenbaum have shown that the response from a definite cortical area to the same stimulus repeated after an interval, may be quite different in character and extent, and this would appear to demonstrate that the relative prominence of an association is a variable quantity. This can be instanced in another way when the neuro-muscular junction of the sympathetic nerve supply to the bronchiolar muscle is stimulated by adrenalin, the response varies, sometimes being a contraction and sometimes a dilatation occurring as the bronchioles are dilated or contracted.

On introspection it is also fairly obvious that a stimulus which at one time might produce a pleasant sensation, would at another produce an unpleasant one and vice versa. If we admit the organic basis of these nervous disturbances it will be quite obvious that the psycho therapeutid method of attempting to replace unpleasant affective states by more pleasant ones or to superadd associations which will alter the affective state is only a method of symptomatic treatment. As such it is undoubtedly most valuable, but uncombined with/

with treatment of the organic basis one can hardly expect it to produce a radical cure.

Hysteria.

So far we have dealt with the type of neurosis whose fundamental characteristic is a hyperactivity of the mechanism of affection. We must now discuss the type of disorder in which there is an impairment of the activity of this mechanism; that is, hysteria. In the last few years our ideas of hysteria have undergone considerable alteration and we have come to discard what were termed the stigmata of hysteria.

The generally recognised view which was originally propounded by Babinsky is that the symptoms of hysteria and the appearances of malingering are identical and can only be distinguished by subjective criteria. To understand properly a hysteric it is almost essential to have some idea of his general orientation and behavious before he is seen by the physician. The picture usually disclosed by the information of relatives and friends is that of a markedly egoistical individual whose emotions are shallow and not lasting, but who is always desirous of impressing the intensity and long duration of these upon his friends. He shuns work, trouble and danger, but will indignantly deny the truth of this. His character is weak and he has

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a low mental resistance. He is not by any means "a mass of suppressed emotions." To sum up the hysteric, we might say that he hides his paucity of emotion by exaggerated acting. The objective study of a large number of typical hysterical cases bears this out. These men appeared to be markedly emotional, but on the occasion the emotion was evoked the galvanic response was extremely low. One case of a soldier suffering from hysterical contraction of the foot, bursting into tears and said that he wished he had been killed instead of his brother who was the favourite son of the family. During this outburst the galvanometer remained steady.

Hysteria then is purely imitative and the hysteric reacts subnormally to all forms of nocuous stimuli. We may therefore assume that the activity of his affective mechanism is subnormal. As was previously shown the mechanism of reaction is two-fold. We have the discriminatory cortical mechanism which is associated with intelligent behavious and we have the reaction of the organism as a whole to a nocuous stimulus. The hysteric has a normal cortical faculty but his general bodily reaction is much reduced. Consequently if the stimulus is continued he lacks the reinforcemeht of the bodily reaction. As the mechanism of affection fails him in this respect/

respect, he is at the mercy of any casual stimulus which may arise and he has to fall back largely on his discrimination. If danger arises he must think of the forms of expression which are associated more or less with unpleasantness. The most obvious association is that of bodily ailments and he attempts to symbolise to the outer world that he is threatened by nocuous stimuli by adopting, let us say, a paralysis.

The next point to be dealt with is the extreme suggestibility which most hysterics manifest. This is because they lack feeling. Most of our judgments, however impartial they may seem, spring from definitely preconceived ideas or feelings on the subject and a mind dissociated from these feelings is a mind at the mercy of any suggestion. The mind of the hysteric is always open to either autogenous or heterogenous suggestions. His reflex patterns have lost the power of reacting to nocuous stimuli and therefore have lost the protective power which they possess in the average individual. Babinski and his followers maintain that the criterion of an hysterical symptom is that it is capable of voluntary stimulation by the malingerer - in other words that the range of the hysteric is limited to exactly the same extent as that of the malingerer simply by whether the symptom can be voluntarily produced or not. This is all very well as far as it goes, but who can tell us what is the limit of/

of will power?

Our study of cerebral activity has revealed a number of objective reactions which taken individually are not controlled by voluntary effort, but in considering their sum total it is obvious that they are the results of volitional effort. The hysteric, who as we have seen, lacks feeling, appears to be more readily able to assume this state of hyper-tonicity, and this explains why, in many hysterics, the involuntary reactions are exaggerated. He will start at a sound much more than will a normal individual. His knee jerks will be exaggerated and it will be sometimes possible to elicit a false clonus. That these reactions are involuntary is easily demonstrated, because their reaction time is that of an ordinary individual, .05 of a second. The functional clonus can occasionally also be elicited in a normal individual if he is made to concentrate his whole strength on a dynomometer. Generally speaking it is possible to diagnose an hysterical from an organic condition by the fact that in the hysteric many of the allied and associated symptoms which would be present in the organic disease are absent in the hysteric. This of course is a cardinal and recognised method of distinguishing the two conditions and the explanation is well-known, and lies in the patient's lack of knowledge of physiology. In certain conditions/

conditions however as has been pointed out by Hurst, the associated mechanism is so intimately associated that it is impossible to produce a reaction without it, or if the reaction is inhibited, the association may also be inhibited. Thus in the case of an hysterical deafness to maximal stimuli, the start may be suppressed. This however does not apply to the affective reaction because although the start is suppressed there is a well-marked galvanic reflex. This would seem to be a direct contradiction to Babinski's theory as according to him the start should not be suppressed as it is an involuntary mechanism. Why this hyperexcitability should exist in hysterics is not quite clear unless one may assume that it is the result of the individual's conscious and sustained attempt to counterfeit affection. From the history of all cases of hysteria it will be quite obvious that the organic disability is present before the symptoms appear. From Prof. Kraeplin's statistics of the age incidence of hysteria, it would appear that the vast majority of cases originate between the ages of 15 and 20. This would appear quite natural because that is the time when the individual is first exposed to the real stress of life. The rapid decline in incidence after the age of 20 is probably due to the lessening of the organic response rather than to any decrease in the stress of environment.

We/

We have already seen that as far as can be traced the experiences of the hysteric differ in no way from those of the ordinary individual, and therefore we must conclude that he cannot have the same power of resistance to his environment as that of a normal individual.

From the observations which have been recorded and from the analogy of such conditions as Dementia Praecose and Manic Depressive Insanity the pre-existence of an organic disturbance would seem extremely probable.

SUMMARY.

In order to sum up briefly the results of our objective examination of the neuroses it will be first necessary to recapitulate the main headings of the conception we have formed of normal neurological function and reactions.

The brain is an ordag for receiving, storing and returning movement from and to the outer world. The other bodily organs also possess this function to a less extent.

The neuroses are disorders of mechanism and the part of this usually affected is that of expression. In order to diagnose and understand such a disorder one must look for objective variations from the normal.

The experiences of the neurotic differ in no way from those of a normal individual, but they can be recognised as being unstable before the occurrence of the mental disturbance, which in all cases precedes the symptoms.

Our objective study is under 2 main heads:-

(1) observation of general conduct,

(2) the record of specific bodily reaction or movement, and this is observed in muscular, sensory and circulatory changes. Thie reaction is of two types/

types (a) the specific reaction and specialised response of certain nerve mechanism and (b) the general reaction of the body to nocuous stimuli.

Thought is expressed by internal and external speech. Following an external stimulus there is an activation of the group of muscles and then the appropriate movement is performed.

Mental effort causes an increase in tonus throughout the body, it also increases bodily efficiency. It gives rise to a feeling of strain or discomfort which is followed by relaxation after the completion of the task. If the reaction is inadequate to perform the task then the discomfort is increased and an emotional affect is produced.

The variation in the skin resistance to an electrical current may be called the physico-psycho-galvanic reflex, and an affective state will lower this resistance. This lowered resistance indicates increased metabolic efficiency, and we have seen that it is activated from the thalamus; that being so, it is obvious that the reflex is concerned dir directly with only a part of the mechanism for expressing an affective state. As it is thalamic and therefore involuntary, the reaction cannot be counterfeited. If, however, a stimulus causing the reaction be constantly repeated, the reaction/

reaction becomes less. This is described as "progressive indifference" and indicates some degree of cortical inhibition or conditioning as in the neuroses. The galvanic response can only be evoked by a nocuous stimulus and this also increases the effort tonus. A benign stimulus raises the skin resistance, decreases tonus and lowers vital activity.

A sensation possesses the qualities of clearness, quality, intensity and duration; an affect has all these with the exception of clearness.

An affective state has two elements (1) the higher cortical discriminating consciousness and (2) the thalamic response to nocuous stimuli. This latter as we have seen is involuntary and is probably an elaboration of protective reflexes. The two co-operate to produce an affective state. Thalamic stimuli to the cortex come equally from all over the body. If the stimulation be maximal one may predominate and you get an organic sensation e.g. vomiting.
A similar condition prevails in the neuroses and may give rise to a paralysis. We have also seen that an affective state is preceded and probably suggested by action.

The relation of nocuous stimuli to endocrine secretion. In affective states there may be a slight increase in the adrenalin in the circulation. This is insufficient to have any/

any effect. Small quantities of adrenalin however increase the threshold excitability. The injection of thyroxin raises basal metabolism, lowers skin resistance and increases mental efficiency.

To summarise essential nerve mechanisms we may say that the cortical mechanism which conditions a reflex is responsible for its maintenance and therefore if this cortical origin can be traced to its source we can identify the repressions and associations which originally caused the response. An ~~inhibited~~ inherited reflex or instinct has no associations because it is a result of "natural selection." Interference with either type of reflex will cause a marked affect.

The disturbance of function in a neurosis is probably due to a catalytic process and seems to be a deficient oxidation. This fact reduced psycho-therapy to the level of symptomatic treatment. It also points to the necessity of rest in the asthenic type of neurosis.

Neuroses in which there is excessive response to stimulation:- These are associated with hyper function of the endocrine glands and especially the thyroid.

Their diagnosis rests on three points:

(1) The galvanic reflex shows lowered skin resistance.
(2) The basal metabolism is raised.
(3) Goetsch's intrademic test is positive.

These/

These three tests are always present in hyperthyroidism.

Neuroses in which conduct is opposed to environment:-

This results in affective symptoms, similar to interference with a habit reflex and may originate a neurosis.

Neuroses of hyperfunction of response mechanism - hysteria:-

Hysteria and malingering are identical in symptoms and so called stigmata do not exist.

Diagnosis hinges on enquiries from relatives as to the general character of the patient. It is then found that he is egotistical shallow and unstable. He exaggerates his emotions. Objectively the galvanic response is low and he reacts subnormally to stimuli.

His discrimination is normal but his bodily response is weakened. As his power of feeling is reduced he is very suggestible and he falls back on bodily ailments to express to the world that he is threatened by nocuous stimuli. The range of these symptoms corresponds to the range of the will. The hysteric assumes sometimes a state of hypertonicity which is probably allied to expectancy. To distinguish a hysterical from an organic condition one usually looks for the absence of some cardinal symptoms, and also considers whether the symptoms can be produced voluntarily. There is a source of error in this latter because sometimes an associated involuntary mechanism may be so closely connected with the voluntary/

voluntary that it cannot be dissociated e.g. the start in functional deafness. Kraeplin's tables show that the greatest age indidence for hysteria is between 15-20 years. This is the time when stress first becomes great and would indicate a preceding instability.

The main object of this paper is to correlate current views on the neuroses and to show the probably organic nerve disturbance which determines their incidence.